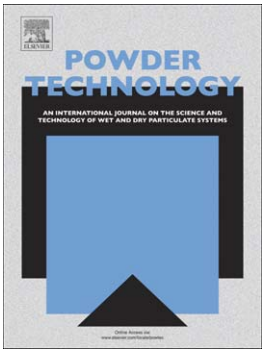

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BLINDED T-BENDS FLOW PATTERNS IN PNEUMATIC CONVEYING SYSTEMS

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Abstract. *Blinded T bends are commonly used in pneumatic conveying systems. The main benefit of this design is that a loose bed of particles accumulates in the blinded pocket of the fitting, allowing particle-particle collision while experiencing a change in the direction of the flow. Such collisions are intended to reduce erosion of the construction material and attrition of the conveyed particles. Since prior research showed that particles will not necessarily accumulate in a blinded T, a series of experiments were conducted to evaluate the effect of the operating parameters on the critical point in which the blinded T becomes effective. In this study we investigate the effect of gas velocity, solid loading ratio, orientation and bend geometry on the critical point using 1.5" and 2" pneumatic conveying systems. The experiments were conducted with NaCl with mean particle diameter of 0.85mm, glass spheres with mean particle diameter of 1mm, plastic beads with mean particle diameter of 4 mm, polystyrene beads with mean particle diameter of 2 mm and cement powder. The blinded T arrangement also varies in depths of the blinded leg. To investigate these phenomena we conducted attrition experiments with NaCl for practical implications. It was found that both the conveying air velocity and the depth of the blinded pocket affect the filling of the blinded T bend. In addition, correlation for the filling of the bend as well as one for complete particle deposition is suggested with respect to the geometry of the bend and the operating conditions.*

KEY WORDS: pneumatic conveying, attrition, bends, blinded T

1. INTRODUCTION

Attrition and wear are well known phenomena in pneumatic conveying systems. Although attrition may occur during the feeding process, flow in bends and in the separation system, in most cases, the pipeline bends are that of the greatest contribution. The mechanism that causes wear and attrition depends mainly on three variables: the particle strength and hardness, bending geometry, and operating conditions. Previous studies [1,2,3] showed a considerable influence of the number of bends on the attrition rate. It was also shown that decreasing the angle of collision reduces significantly the damage caused to the particles. The most controversial aspect is the effect blinded T bends have on attrition rates. In these types of bends, the solids deposition from the blinded pocket is influenced both by the geometry of the probe and the operating conditions applied in the transport line. Additionally, the